

1. malmodeller
2. CREAM

Tomooki Hayasaka

malmodeler

Malfunctioned/Malformed Modeler

Tomooki Hayasaka

Motivation

Automatic geometry extracion can not be done

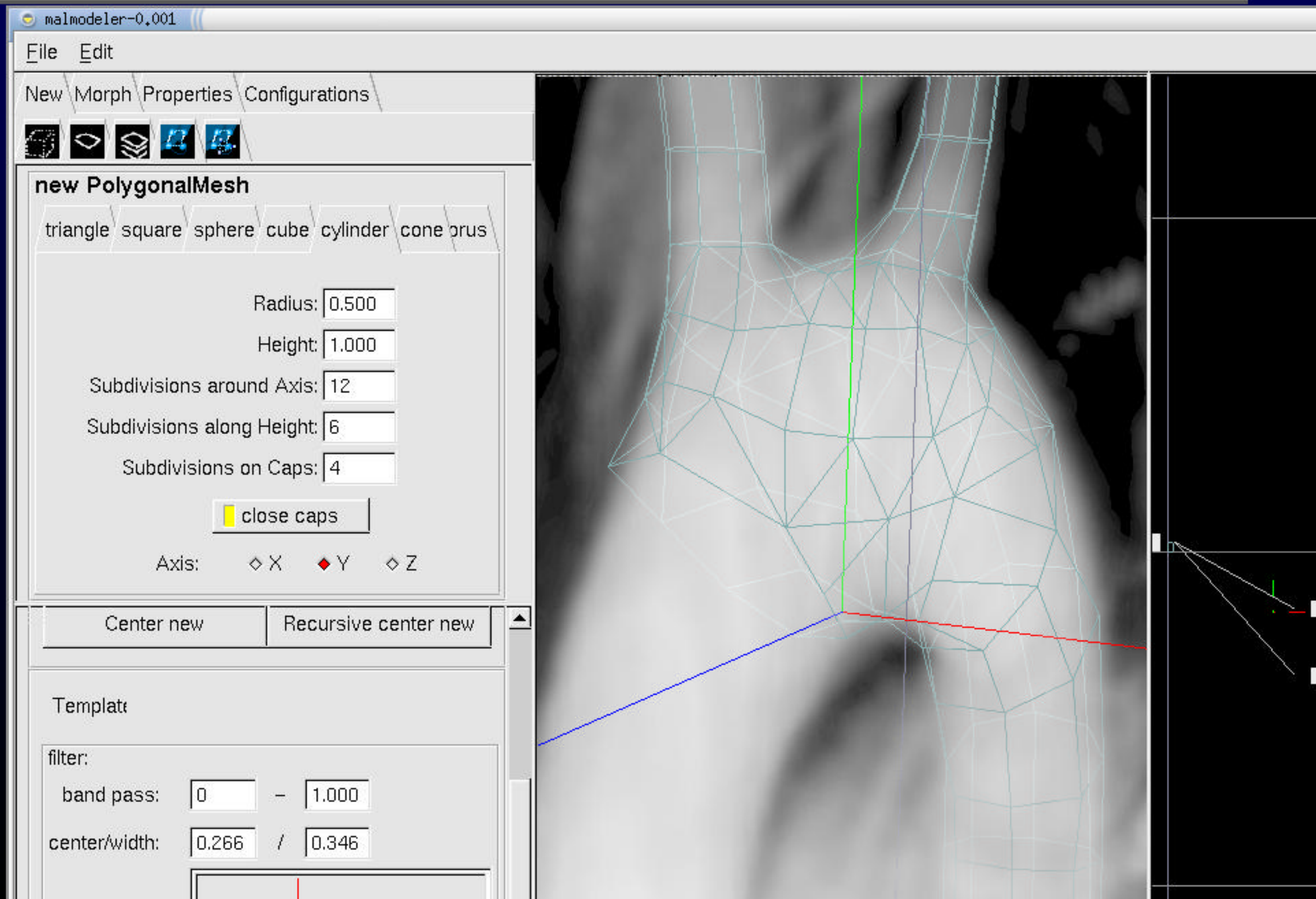
- low S/N ratio
- artifacts

==> Interactive Modeling

Malmodeler Features

- real-time volume rendering
- polygonal mesh of arbitrary topology
- multi resolution mesh

Demo



CREAM

Computational Risk Estimation And
Management

overview
and
status

Tomoaki Hayasaka

Problems

"Computational Biomechanics Simulation is Resource Consuming"

- relies on extensive use of computational resources
- requires interactive modeling for realistic models

Quick Risk Estimation

Keys for quick risk estimation:

"do not model"

"do not compute"

CREAM

- "Computational Risk Estimation And Management"
- apply biomechanics simulation to clinical medicine
- prediction based risk management

UC010_Use-System

MAIN SUCCESS SCENARIO

1. 患者の画像を登録する。 [\[UC003 Import-Image-Push\]](#)
[\[UC004 Import-Image-Pull\]](#)
2. 患者の画像に似た別の画像と対応するモデル、計算結果を DB から検索する。 [\[UC002 Find-Similar-Image\]](#)
3. 計算結果を使ってリスクを推定する。

EXTENSIONS

対応する適当な画像が見つからない

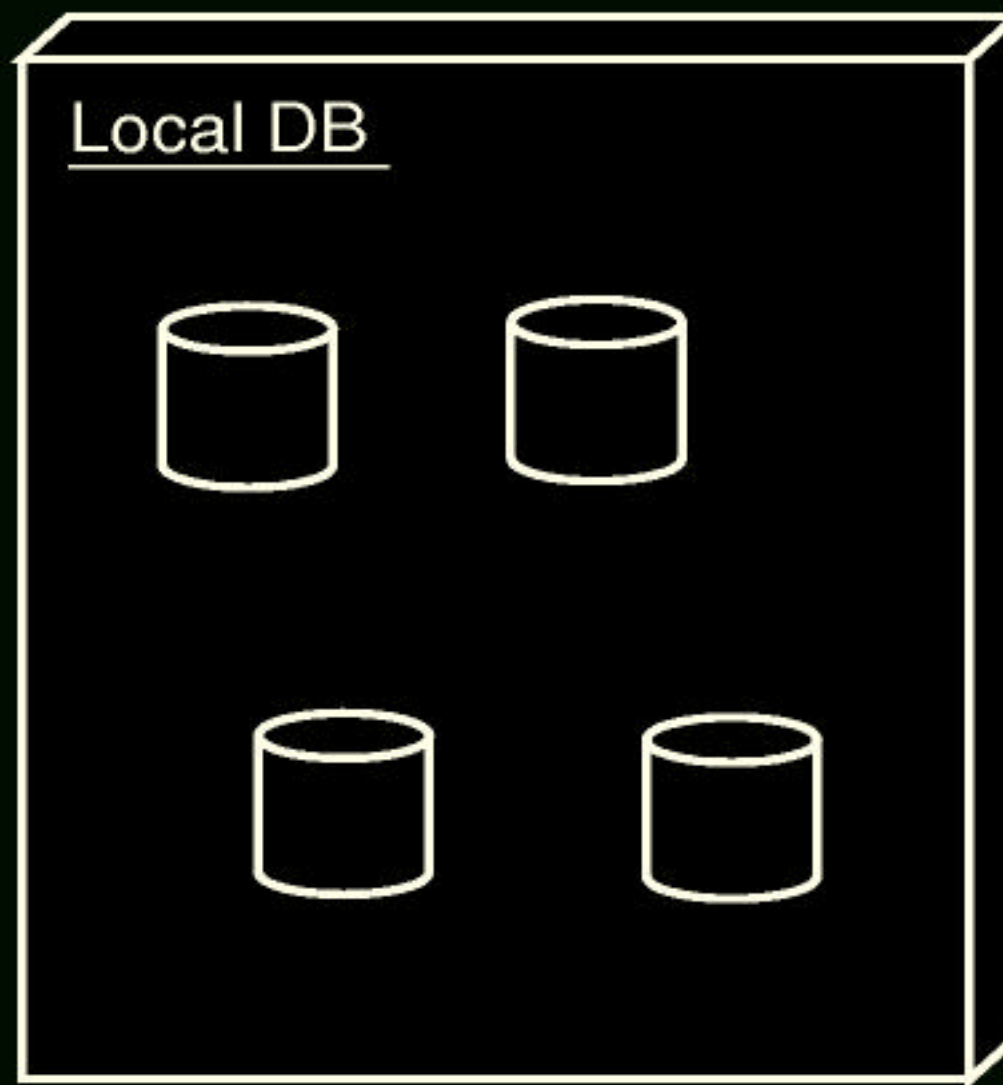
1. システムが、モデルのプロトタイプを自動構築する。
2. ユーザが、モデルのプロトタイプを修正し、対象画像に合わせる。 [\[UC017 Edit-Model\]](#)
3. 計算を行う。 [\[UC015 Generate-Mesh\]](#) [\[UC016 Compute\]](#)

Requirements

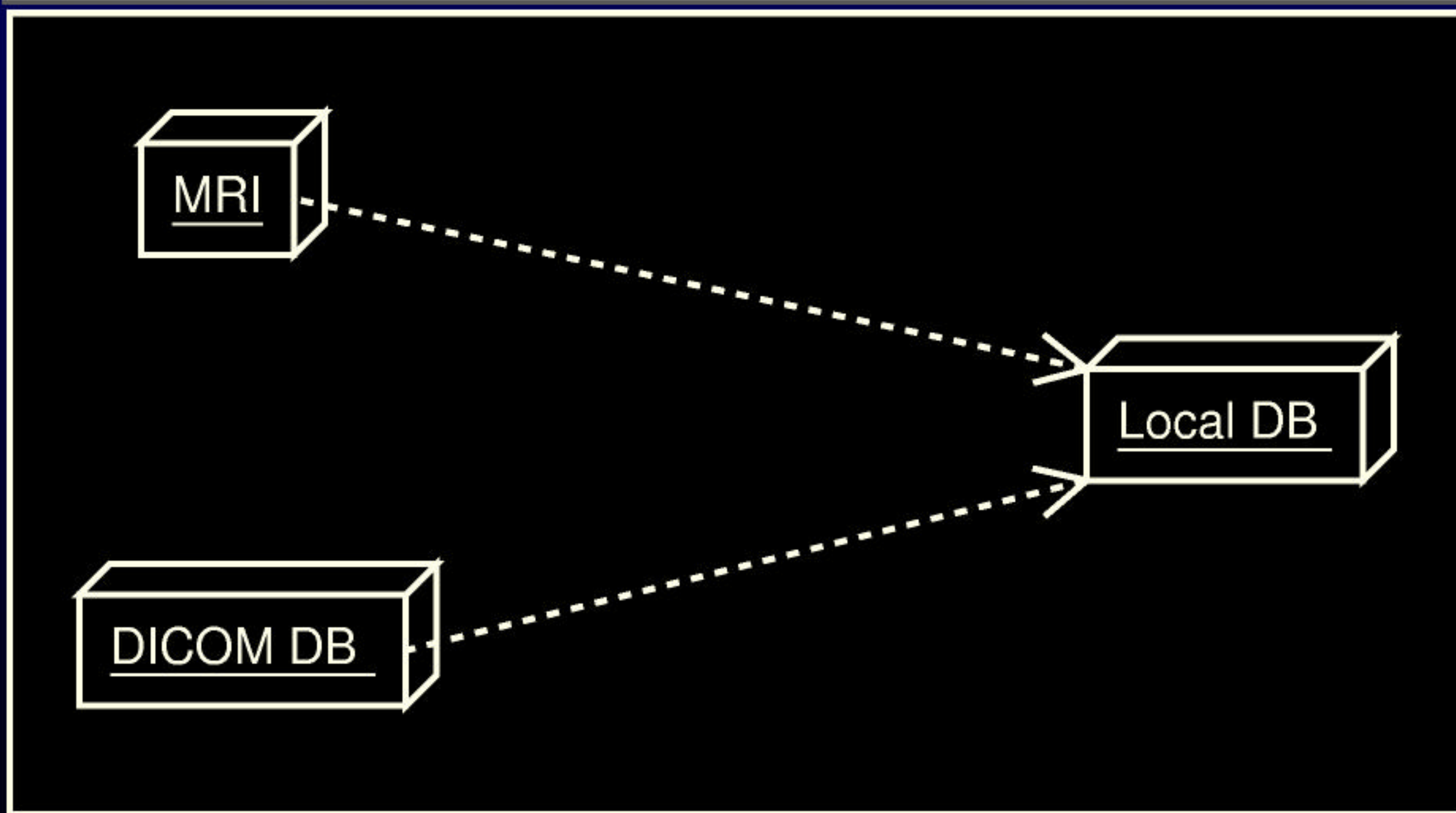
- local DB
- work well with existing modalities
- global DB
- skeletonize & topology estimation
- topology equality predication
- topology matching
- model manipulation
- pre-calculation

Req. - Local DB

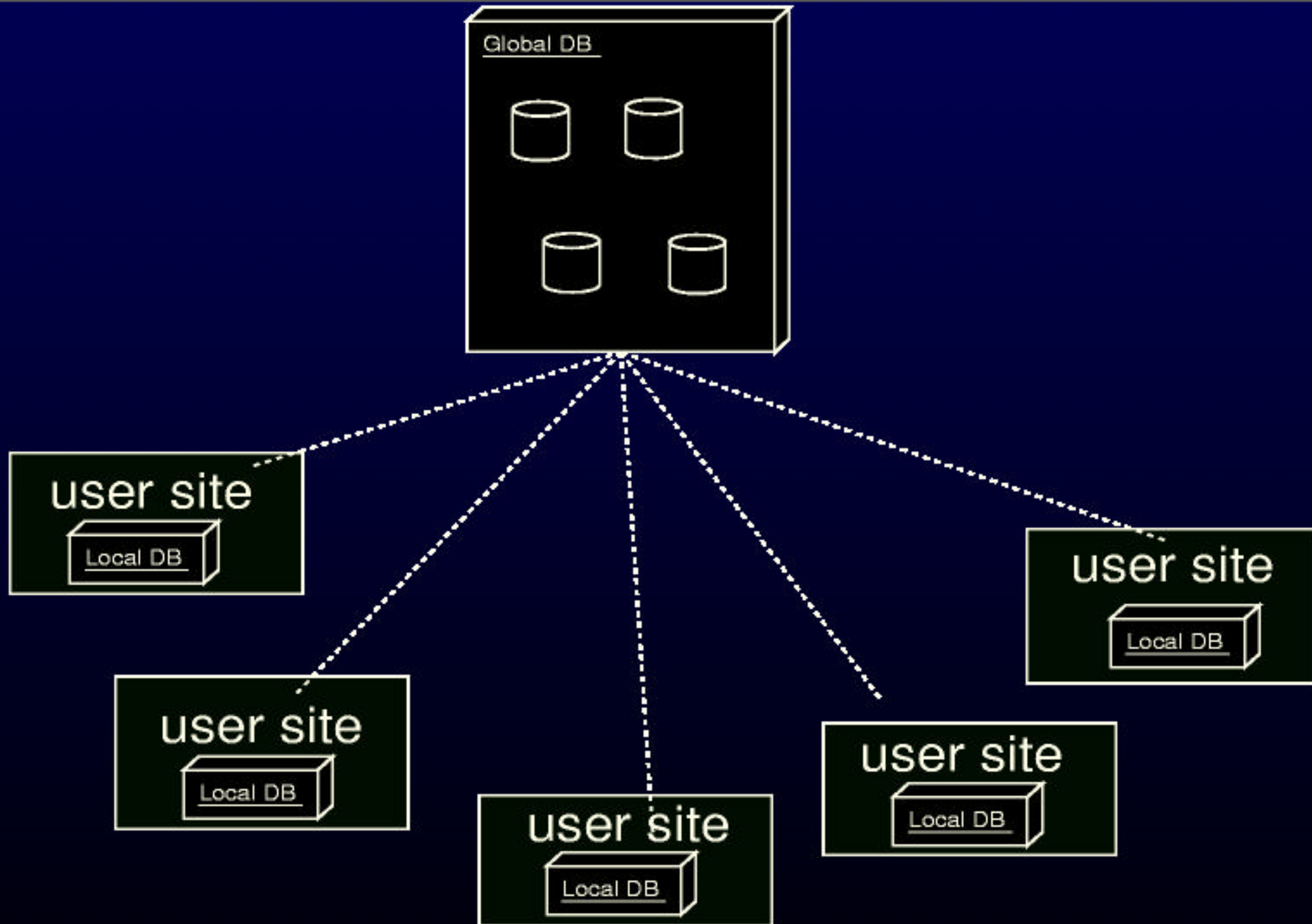
user site



Req. - Existing Modalities

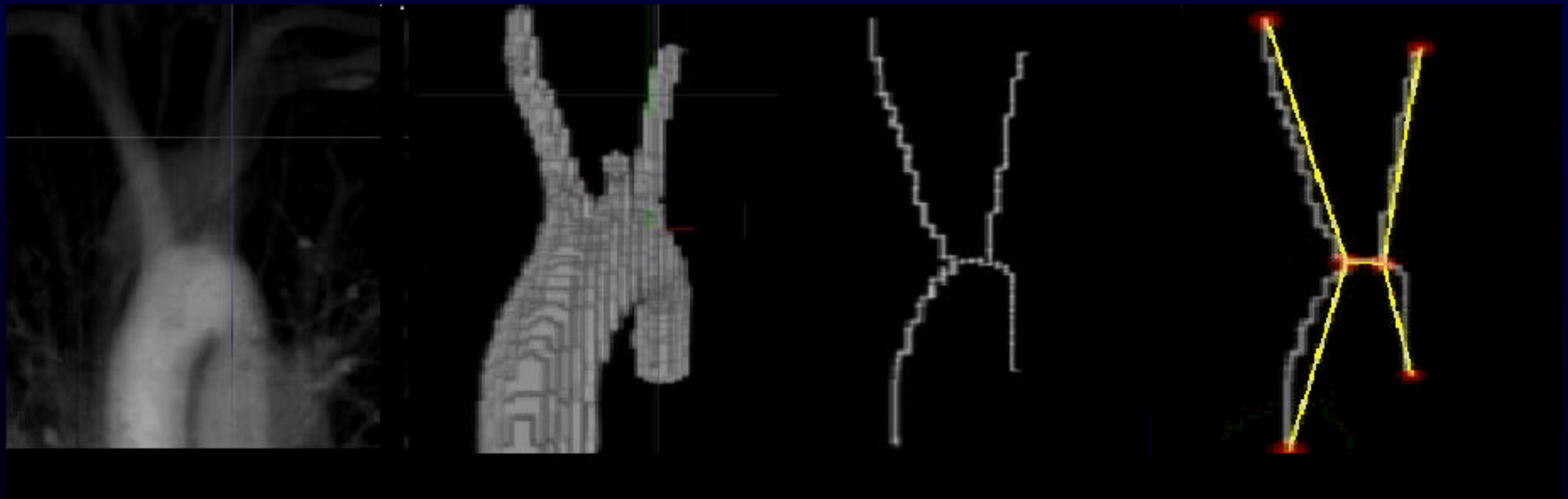


Req. - Global DB

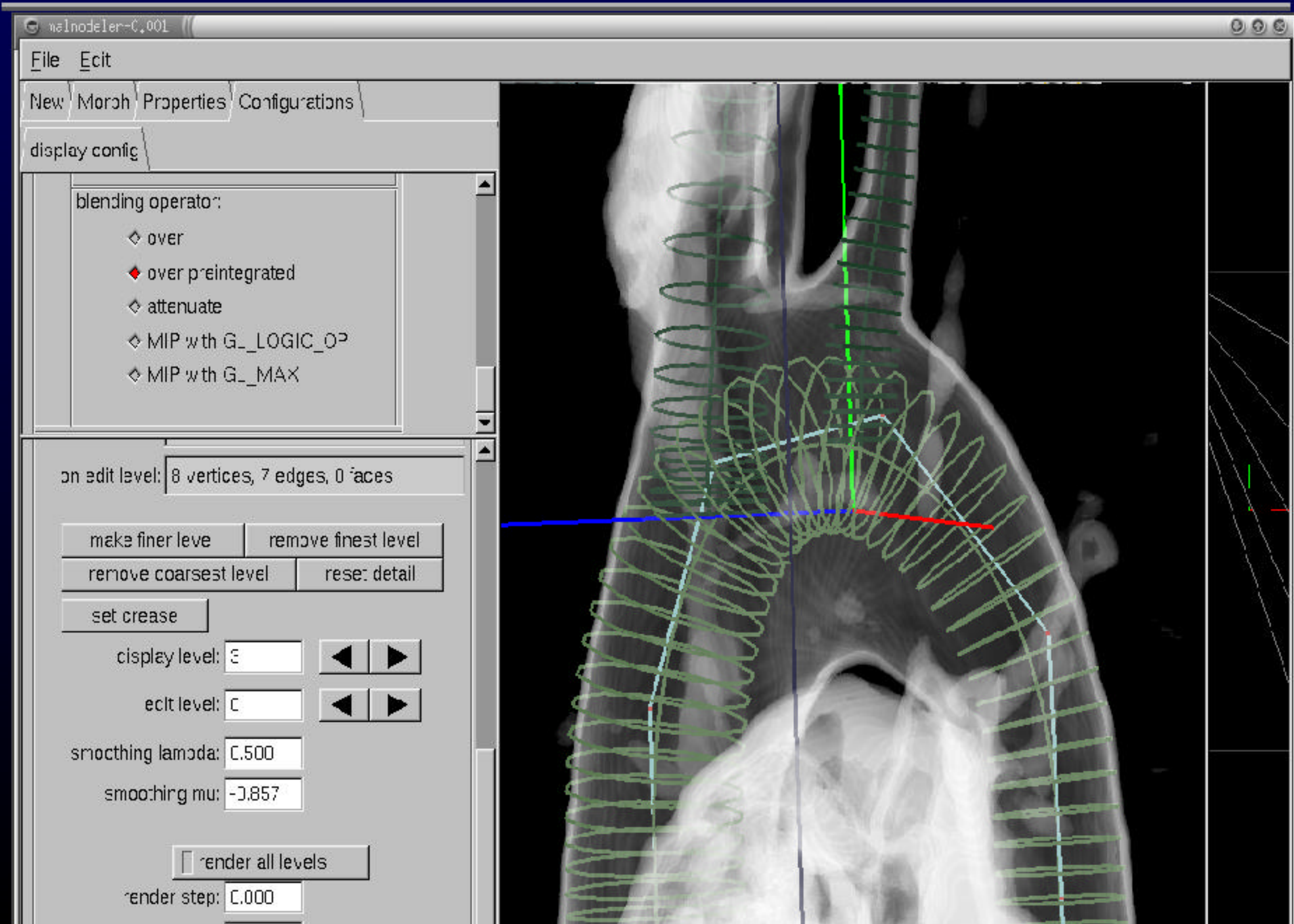


Req. - Find Similar Model

- Skeletonize
- Topology Estimation
- Topology Equality Predication
- Topology Matching



Req.- Model Manipulation

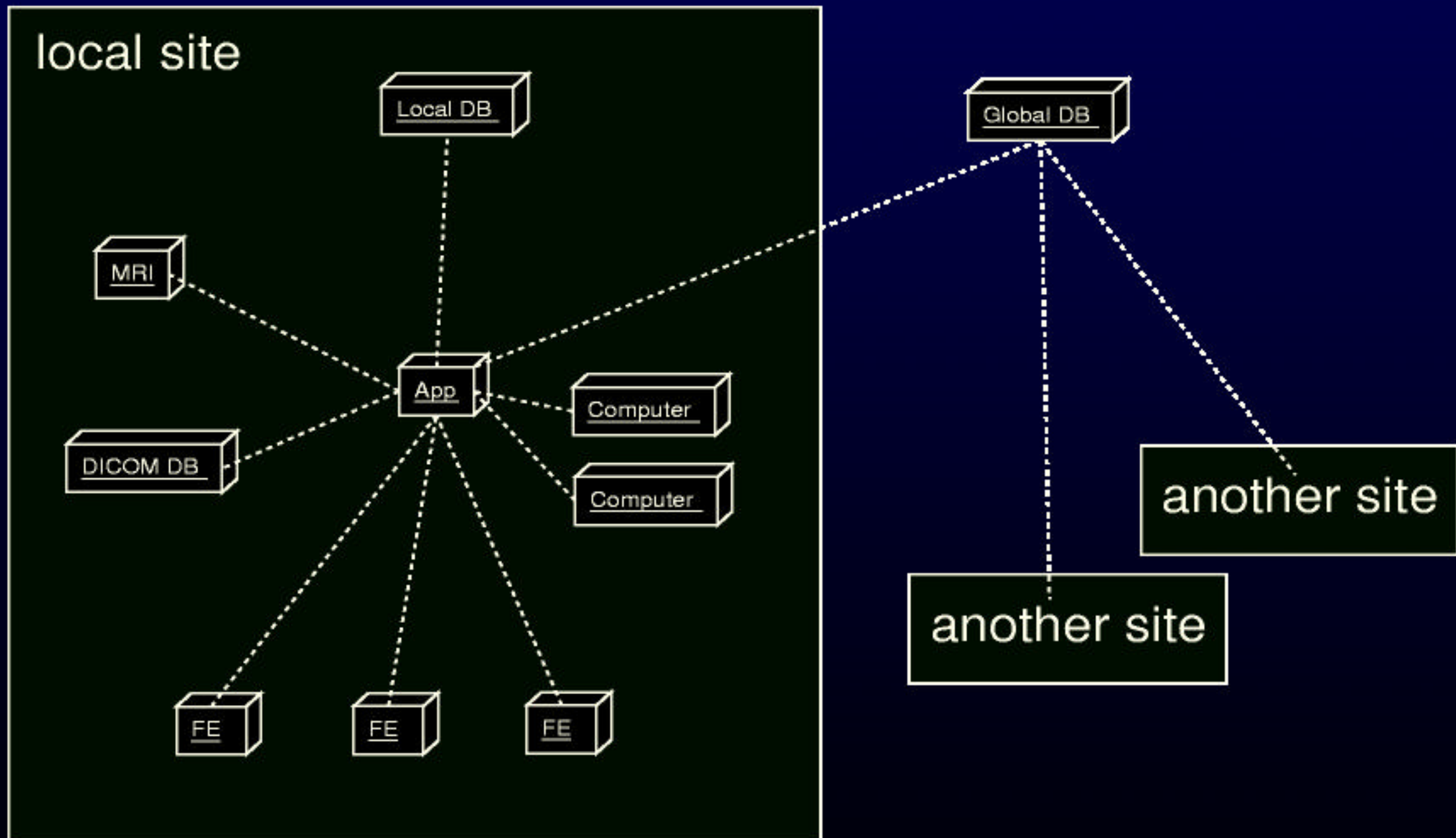


Req. - Calculation

- pre-calculation
- job control
- data management

Architecture

Node Deployment

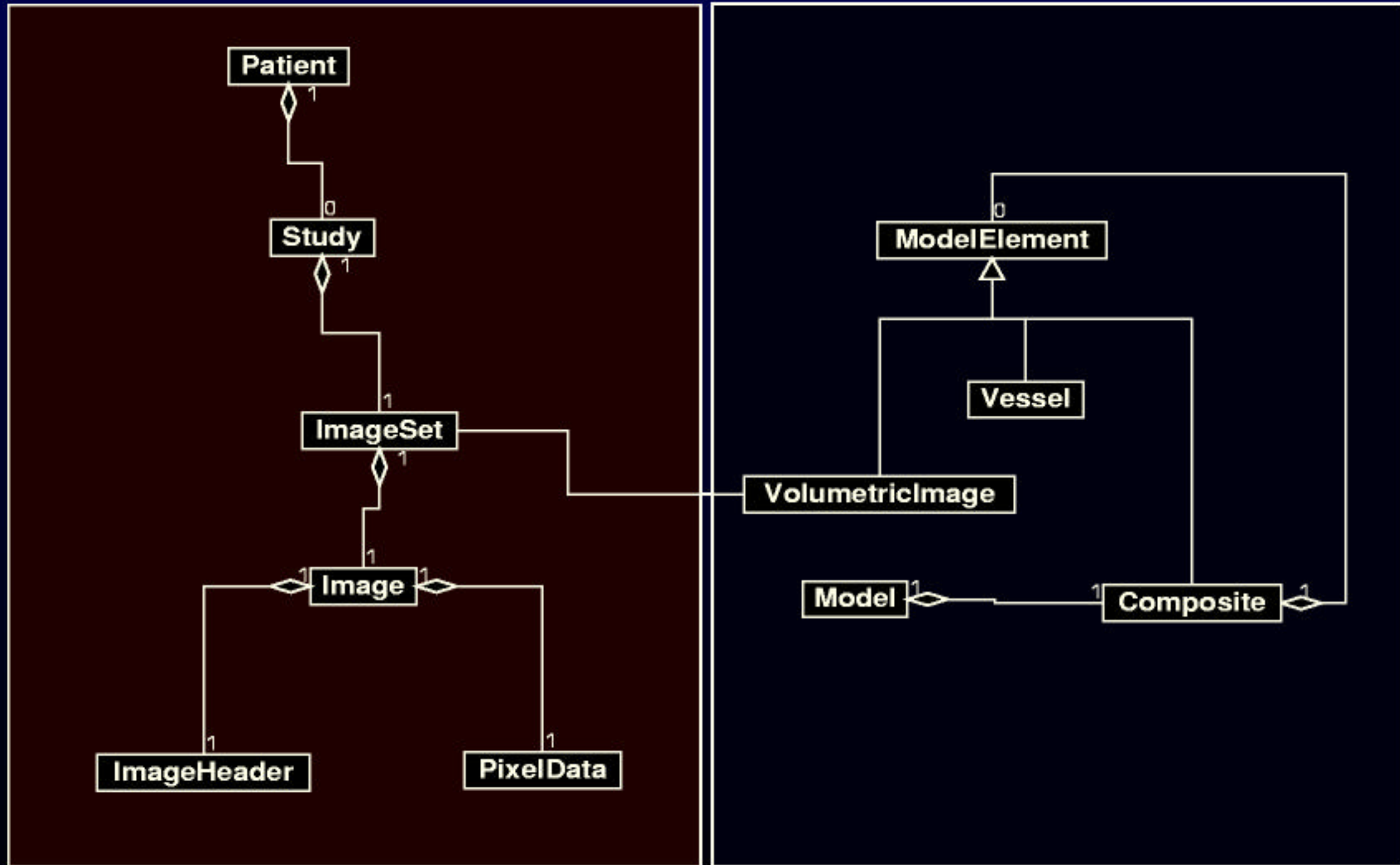


Use Cases

- UC000 Start-Up
- UC001 Shut-Down
- UC002 Find-Similar-Image
- UC003 Import-Image-Push
- UC004 Import-Image-Pull
- UC005 Select-Patient
- UC006 Select-Patient-by-ID (obsolete)
- UC007 Select-Patient-by-Name (obsolete)
- UC008 Authenticate-User
- UC009 Start-FE
- UC010 Use-System
- UC011 Select-Image
- UC012 Make-Binary-Image
- UC013 Skeletonize
- UC014 Make-Topology-Graph
- UC015 Generate-Mesh
- UC016 Compute
- UC017 Edit-Model

DICOM and CREAM

DICOM Image and CREAM Model



Components and Objects

- DB access
- session management
- transaction management
- modeling kernel
- image handling
- volume renderer
- fast marching & level set
- topology handling
- solver
- user interface

Concluding Remarks

- DB of image, model and results
 - find similar image and relevant data
 - utilize results of pre-computation
 - quick modeling based on prototypes
 - pre-calculated initial conditions
-
- design almost accomplished
 - implementation started

Future Works

- implement architecturally minimum necessary part
- design review
- acquire images